DIVISION OF ENVIRONMENT
QUALITY MANAGEMENT PLAN

PART III:

WATERSHED MANAGEMENT SECTION
QUALITY ASSURANCE MANAGEMENT PLAN

Revision 4
12/09/05

Kansas Department of Health and Environment
Division of Environment
Bureau of Water
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APPENDICES.....

SIGNATURES/APPROVALS

Watershed Management Section: _____
(Signature, Section Chief)

_____
(Date)

Bureau of Water: _____
(Signature, Bureau Director)

_____
(Date)

Division of Environment: _____
(Signature, Division QA Manager)

_____
(Date)

1 INTRODUCTION

1.1 Historical Overview of Program

Nonpoint source pollution refers to pollutants that originate from pollutant sources that are widely dispersed across a watershed. Runoff from rains and snow melt is a major carrier of nonpoint pollutants but other sources include spills, individual household septic tank lateral fields, drift from pesticide applications, etc. According to Kansas Administrative Regulation 28-16-28b(k), Nonpoint Source means any discharge not required to have a federal National Discharge Elimination System (NPDES) permit and that results in the release of pollutants to the waters of the state. This release may result from precipitation runoff, aerial drift and deposition from air, or the release of subsurface brine or other contaminated ground waters to surface waters of the state.

The term nonpoint source pollution has its roots in the 1972 amendments to the Federal Water Pollution Control Act (PL 92-500). However, nonpoint source pollution control did not receive serious national attention until the 1987 Clean Water Act amendments. These amendments established as national policy -- "that programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner ..." and directed states to identify water quality problems caused by nonpoint pollutant sources and develop a corrective action plan.

The Kansas assessment and management plan were completed and approved by EPA in 1989. The assessment found a large percentage of Kansas surface waters suffer from nutrient impairment, bacteria, and dissolved minerals.

The Kansas nonpoint source pollution management plan is based on the following fundamental principles:

1. Waters that have water quality impairments require restorative action.

2 Waters that are of satisfactory quality require action to protect them from future damage.

3. All waters are considered threatened unless all pollutant sources within a watershed are using recommended nonpoint source pollution control measures.

4. If water quality problems remain after application of recommended pollution control practices, the remaining pollutants should be removed on a cost-effective basis.

5. Nonpoint source pollution implementation planning and implementation shall be accomplished at the most local level possible.

6. Nonpoint source pollution control is to be achieved through the coordinated effort of state,

federal, and local government agencies and the private sector.

The Kansas Nonpoint Source Pollution Management Plan was revised in August of 1999. The revised plan focuses on:

1 identifying water bodies which require nonpoint pollution control to achieve water quality standards;

2. identifying categories of nonpoint source pollution which contribute to water quality problems;

3. describing best management practices to reduce nonpoint source pollution;

4. identifying non-regulatory or regulatory programs including enforcement, technical assistance, financial assistance, education, training, technology transfer and demonstration projects to achieve implementation of best management practices;

5. providing an implementation schedule for best management practices;

6. identifying sources of assistance available to support implementation; and

7. identifying Federal financial assistance and development programs which will be reviewed for consistency with the State nonpoint source pollution management program.

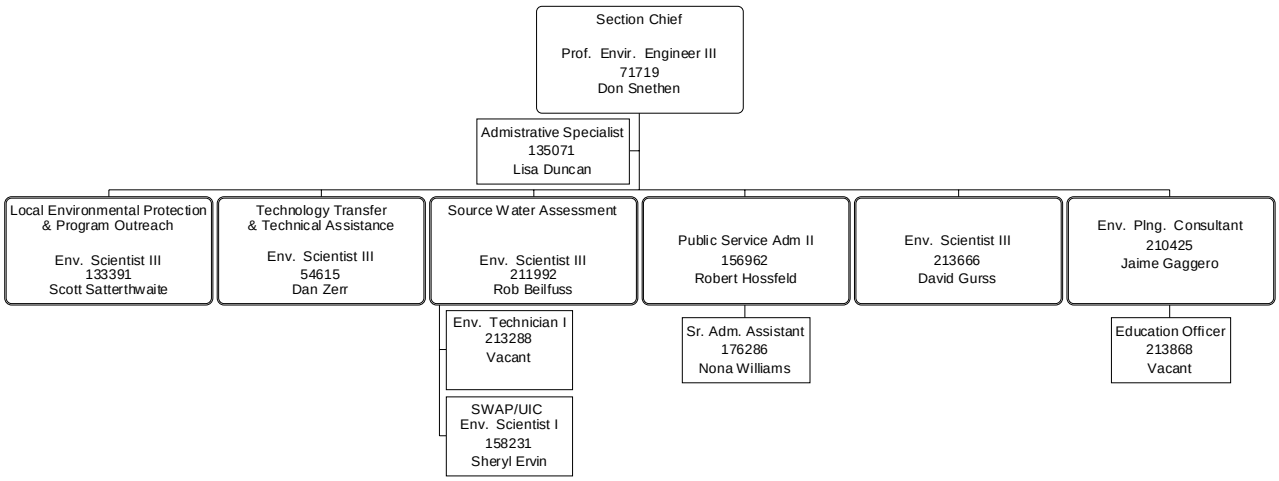
1.2 Quality Assurance/Control Objectives

Quality assurance (QA) and quality control (QC) activities conducted within KDHE's water pollution control program are intended to ensure that all monitoring and analytical data are scientifically valid, defensible, and of known and acceptable precision and accuracy. The Watershed Management Section staff generally do not collect water quality data in the field; however, many grant recipient project cooperators do collect water quality data. According to the Environmental Protection Agency (EPA), any EPA-funded project that collects data must have an approved QAPP prior to data collection. This means that all Watershed Management Section grant projects funded by Clean Water Act Section 319 funds, must have an approved QAPP prior to data collection. The remainder of this document includes some information regarding QA/QC duties of various Watershed Management Section staff, but focuses primarily on QAPP requirements for 319 funded projects.

2 QUALITY ASSURANCE/CONTROL ORGANIZATION

2.1 Administrative Organization

The organizational framework for the nonpoint source pollution control program in the Bureau of Water is depicted in figure 2.1 below.



2.2 Staff Responsibilities

KDHE - Bureau of Water - Watershed Management Section is the lead nonpoint source pollution control agency and is responsible for maintaining the Kansas Nonpoint Source Pollution Management Plan and associated principles and practices. The Watershed Management Section is also the lead agency responsible for coordination of Watershed Restoration and Protection Strategies (WRAPS), nonpoint source technical assistance, information and education, administering Clean Water Act (CWA) Section 319 grants, Kansas Source Water Protection Program, and Kansas Local Environmental Protection Program. As previously stated, all projects funded by CWA Section 319 funds, must have an approved QAPP prior to data collection. It is the responsibility of the Watershed Management Section Quality Assurance Officer to facilitate that development of QAPPs for applicable 319 funded projects. It is also the duty of the Watershed Management Section Quality Assurance Officer to review and approve QAPP submittals, with input from the project officer and section chief. Hard copies of

approved QAPPs will be kept in the project files and will be made available to the Environmental Protection Agency (EPA) for review upon request. Additionally, information regarding QAPP receipt and approval will be entered into the Grant Reports Tracking System (GRTS) for EPA's internal use.

Section 404 of the CWA requires that the Corps of Engineers issue a permit for the discharge of dredged or fill material into waters of the U.S., including wetlands. The Watershed Management Section is responsible for issuing CWA Section 401 water quality certifications for this activity. These certifications are prepared by the Section 401 Water Quality Certification Coordinator (WQCC). These certifications stipulate water quality protection measures needed to ensure dredge and fill activities do not violate Kansas' water quality standards. On a complaint and random selection basis, Watershed Field Coordinators located in KDHE district offices inspect 404 permitted activities and monitor implementation of water quality protection measures stipulated by the certification. The Watershed Field Coordinator provides the permittee a written inspection report detailing the findings of the inspection and as necessary provides recommendations to address deficiencies and opportunities for improvement. Inspection reports are co-signed by the WQCC prior to issuance to the permitee. If needed, KDHE may request water quality monitoring as water quality certification condition. If monitoring becomes a requirement of the 404 permit, a Quality Assurance Project Plan (QAPP) shall be developed based on specifications provided with the water quality certification. Watershed Management Section staff will provide technical assistance for monitoring and quality assurance activities, as needed.

3 QUALITY CONTROL CRITERIA AND PROCEDURES

3.1 Monitoring Site Selection Criteria

The Watershed Management Section will work with grant project cooperators to develop monitoring site selection criteria on a site-specific basis. The following is a description of general monitoring site selection criteria to be applied to specific grant projects.

The selection of stream monitoring sites is based on several factors including type and purpose of sample, representativeness, ability to document the location of the sampling site, prevention of sample contamination, accessibility, and safety. Monitoring sites are typically located just above the mouth of headwater or lower order streams in order to assess the water quality impacts of nonpoint source (NPS) pollution loading within a given watershed or sub-watershed.

The selection of groundwater monitoring sites is based on several factors including type and purpose of sample, gradient and distance from known or suspected contamination, representativeness of the sample, accessibility, landowner permission, and safety.

3.1.1 Stream Sampling Sites

Map reconnaissance should be conducted prior to arrival in the general area of the site. Field staff should familiarize themselves with general terrain, major waterways, road networks, unique topographical features, and other man-made objects that may influence environmental monitoring. Based on the map review, a detailed field observation should take place to verify map information.

Upon completion of the first two steps, and supplied with the project goals and objectives, monitoring site selection can proceed. Factors that may influence site selection include: accessibility, relationship to known or suspected sources of pollution, relationship to other influencing contaminated locations, availability of media to sample, location of existing sampling sites, and potential safety hazards.

The point of collection should be readily accessible. The point of collection should be easily described, as field staff other than the designated sample collector may be needed to collect samples in the event the designated sample collector is unable to perform his/her duties.

Site selection for composite sampler(s) installation should follow the same general criteria in that the samples must be representative of the portion of the watershed which is to be studied, and the site must be easily accessible and at a location that can be documented. The sampling device and battery should be housed in a lockable metal box and chained to a tree or post for security purposes, and in the event of a flood. The suction line and liquid level actuator and/or bubbler line should be enclosed inside PVC pipe, to protect against flooding and vandalism damage.

The PVC pipe should be anchored to the stream bank and bed with steel posts. The sampling device

and associated equipment should be located a sufficient distance from transportation corridors such that public access to the equipment is minimal.

3.1.2 Groundwater Monitoring Sites

The following factors are generally included in the well selection process: purpose of sampling and type(s) of contaminants being investigated, groundwater gradient and distance from known or suspected contamination, representativeness of the sample, accessibility to well, depth to groundwater, depth of screened interval, distance to a public water supply well, landowner permission, and safety. Well candidates with previous water quality information will be given additional consideration. Groundwater monitoring wells should be purged of at least three well casing volumes of water prior to sampling to ensure a sample that is representative of the surrounding aquifer.

3.1.3 Lake Monitoring Sites

The following factors are generally included in selecting a lake monitoring site: purpose of sampling and type(s) of contaminants being investigated, location of existing monitoring sites, accessibility, water depth, seasonal variations in lake stratification, water body designated uses, distance from sources and/or tributaries, landowner permission, and safety.

3.2 Sampling Procedures and Sample Custody

3.2.1 Stream Samples

Stream sampling procedures may vary based upon specific project needs; however, grab samples should be collected in general accordance with SOP No. SCMP-001, which accompanies the QA management plan for the Bureau of Environmental Field Services (BEFS) stream chemistry monitoring program. Composite samples should be collected in general accordance with SOP No. RRMP-001, which accompanies the QA management plan for the BOW rainfall runoff monitoring program.

3.2.2 Groundwater Samples

Groundwater sampling procedures may vary based upon specific project needs; however, groundwater samples should be collected in general accordance with SOP No. GQMP-005, which accompanies the QA management plan for the Bureau of Environmental Field Services (BEFS) groundwater chemistry monitoring program.

3.3 Analytical Procedures

Analytical procedures used by project cooperators are generally field laboratory tests. These analytical procedures can be grouped as titration, colorimetric, or ion selective electrode analysis. Safety procedures should be followed precisely when handling reagents used in these test procedures, particularly the strong acids and bases used in dissolved oxygen sample preparation and titration.

Analytical procedures for field laboratory tests are test or equipment specific. Project specific QAPPs should include an inventory of field laboratory tests and equipment, calibration requirements, standard operating procedures, and maintenance requirements.

3.4 Internal Procedures for Assessing Data Precision, Accuracy, Representativeness and Comparability

3.4.1 In House Audits

The chief of the Watershed Management Section (WMS), in conjunction with the designated quality assurance officer, is responsible for assuring that all data derived from all WMS sponsored sampling/monitoring projects are of sufficient precision, accuracy, representativeness and comparability to meet project objectives. All water quality data are given close scrutiny, both by the WMS chief and by the quality assurance officer. All data are reviewed with existing sampling conditions kept in mind. This is particularly relevant with runoff event samples, in which contaminant concentrations can vary widely between samples depending upon conditions at the time of sampling. Data that cannot be reconciled with available knowledge of site and sampling conditions are considered invalid, and will not be used in any subsequent reports.

3.4.2 Instrument Calibration and Standardization

Instrumentation used in field sampling activities varies based on project specific needs. All project specific QAPPs should include a list of field equipment/instrumentation to be used, calibration procedures, and appropriate standards to be used during calibration procedures. Factors that affect instrument calibration frequency may include: ambient air temperature, instrument accuracy, sample matrix interference, and number of samples collected. ..

3.4.3 Procedural Blanks, Duplicate Measurements and Spiked Samples

Procedural blanks, duplicate measurements and spiked samples are used in quality control programs to ensure that samples have not been contaminated and that analytical methods are accurate; however, many grant projects do not require this level of quality control. The need for procedural blanks, duplicate samples, and spiked samples will be determined on a project specific basis, based primarily on project goals, data usage, and data quality objectives (DQOs).

At the discretion of the Chief of the WMS or the Bureau Director, blind reference samples, spiked with known concentrations of one or more parameters, may be submitted to KHEL and used as a general indicator of the overall accuracy of the data reported by the laboratory.

The following is a summary of recommended procedures for using blanks, duplicates, and spikes samples.

The possibility of sample contamination during sample preparation, storage and analysis is assessed through the use of procedural blanks, prepared with ASTM Type I-quality water and subjected to the same treatment as the rest of the samples collected as a result of the project. Under this protocol, blanks are utilized in the following manner:

(a) The concentration of a given parameter is calculated by subtracting the reported blank concentration from the reported sample concentration.

(b) Should the blank concentration exceed the sample concentration, a corrected concentration normally is not included in the data file; however, should the sample concentration be less than the minimum detection limit (MDL) of the analytical method, the concentration is recorded as such regardless of the blank concentration.

(c) Should the blank concentration be less than the MDL, the sample concentration is recorded without modification.

The possibility of sample contamination from sample containers is assessed through the analysis of container blanks. Five percent of the sample collection containers are selected at random, partially filled with ASTM Type I-quality water, sealed, and stored for a 48-hour interval. The resulting container blank is analyzed to determine levels of impurities leached from the container walls. If detectable levels of impurities are observed, two grab samples are collected at a selected location each time. Data generated by the duplicate sampling effort are used to assess the chemical variability of the sampling and analysis activities. These data provide a basis for quantifying any statistical uncertainty.

3.4.4 Preventative Maintenance

For all grant projects utilizing field sampling equipment or laboratory sampling equipment, a preventive maintenance program should be maintained to ensure that all field sampling and laboratory equipment is maintained in good condition and is in a state of readiness.

3.4.5 Safety Procedures

Safety procedures for handling field sampling and laboratory equipment must be followed carefully. Safety hazards include handling strong acids, strong bases, and toxic reagents. Materials to be sampled also present safety concerns, particularly sewage with its potential for infection. A listing of the hazards likely to be encountered and safety precautions necessary is included in Appendix C.

3.5 External Procedures for Assessing Data Precision, Accuracy, Representativeness and Comparability

3.5.1 Onsite Audits

Bureau of Water programs may, at the discretion of the Division QA Director division director, or the granting agency, be required to participate in periodic QA/QC audits conducted by an independent third party. Audit findings, and corrective actions implemented in response to such findings, shall be reported to the bureau director and Division QA Director and addressed in detail within the annual program evaluation.

3.5.2 Inter-laboratory Sample Comparison Programs

If needed, KDHE may split samples with a project cooperator and compare sample results with those generated by KHEL. Comparison between laboratory results shall be reviewed by the program manager or unit chief and passed on to the section chief for inclusion in an annual QA report. Consistent finding of disparities greater than 10% shall be cause for implementation of corrective action procedures.

3.6 Corrective Action Procedures

WMS projects should include corrective action procedures to address equipment malfunction, sample contamination, and staff performance problems. Corrective action procedures should identify the person responsible for identifying problems and provide a course of action for correcting the problem. The following is a summary of KDHE BOW corrective action procedures which may apply to WMS projects.

3.6.1 Equipment Malfunction

Field equipment under BOW control is subject to corrective action procedures detailed in the appropriate Standard Operating Procedure. Any deficiency in performance discovered during routine use or during an internal or external performance audit is recorded and filed, and reported to the Section Quality Assurance Officer. The Quality Assurance Officer (QAO) is responsible for appraising the scope and seriousness of the problem. Within manufacturer's guidelines, the QAO may elect to service the instrument or return the instrument to the manufacturer for repair or replacement.

The QAO is responsible for identifying any effects the equipment malfunction may have had on the quality of data collected. Data that have been influenced by equipment malfunction are reviewed by the QAO and the WMS chief. Based upon their determination of data accuracy, the data will either be flagged within the data set as questionable, or deleted from the data set.

3.6.2 Sample Contamination

If an obvious error is made in the field during sample collection, the sample is discarded in an appropriate manner.

3.6.3 Staff Performance Problems

If a member of the project or field staff have difficulty with a given work procedure, an effort is made by the QAO to identify the scope and seriousness of the problem, identify any data affected by the problem, and recommend corrective action. All effected data are either deleted from the file or flagged within the file, at the discretion of the QAO. Possible corrective actions include further in-house or external training for the employee, a reassignment of work duties, or modification of the work procedure.

3.7 Data Management

WMS project QAPPs should include data management information. This information may include: field data recording sheet information, computer storage, data entry, data entry quality control/corrective action, statistical analysis, reporting requirements, and data storage time schedules.

For KDHE sampling activities, completed sample analysis reports from KHEL are delivered by inter-office mail to the WMS Quality Assurance Officer for review, then routed to the appropriate WMS project manager for data review and validation. The data are checked for conspicuous oversights or dubious results. If problems are noted in the data reports, corrective action procedures are initiated in accordance with Section 3.6. Each analysis report is electronically filed at the laboratory; hard copies are filed in the appropriate WMS file. All data are stored on file for a minimum of five years.

3.8 Quality Assurance Reporting Procedures

WMS project QAPPs should include quality assurance reporting procedures. These procedures should describe the flow of QA/QC information among project personnel and identify specific reporting responsibilities.

The WMS QAO is responsible for informing the section chief of project QA/QC status and of any QA/QC needs within the WMS program. The QAO is also responsible for maintaining adequate communication with KHEL with regard to program QA/QC concerns.

In addition to these routine communication requirements, the BQAO prepares an annual program QA/QC status report which is routed through the bureau director to the Division QA Director. This report contains the following types of information:

(a) status of QA project plan;

(b) description of data accuracy, precision, completeness, representativeness and comparability;

(c) discussion of significant QA/QC problems, corrective actions, progress, needs, plans

and recommendations;

(d) results of internal and any external system or performance audits;

(e) summary of QA/QC-related training performed since the last QA/QC status report; and

(f) any other pertinent information specifically requested by the bureau director or the Division QA Director.

3.9 Field Investigations

WMS staff or KDHE District Office Watershed Field Coordinators (WFCs) may conduct field investigations for a variety of reasons. These may include non-point source pollution complaint investigation, CWA Section 404 Permit compliance, and construction storm water NPDES permit compliance.

Many public complaint investigations involve failing onsite waste water systems. Field investigations of failing onsite wastewater systems should follow Standard Operating Procedure NPS-001: Determining a Public Health Hazard or Nuisance From Improperly Managed Domestic Wastewater (see Appendix A). Occasionally, field staff will collect water samples during complaint investigations. SOP NPS-001 includes a protocol for collecting grab samples from surfacing domestic wastewater effluent.

CWA Section 404 Permit compliance inspections should follow Standard Operating Procedure NPS-002: Conducting CWA Section 404 Permit Field Investigations (see Appendix B).

Construction storm water NPDES permit investigations should be conducted in accordance with KDHE Bureau of Water Industrial Program requirements.

APPENDIX A

STANDARD OPERATING PROCEDURE NPS-001

DETERMINING A PUBLIC HEALTH HAZARD OR NUISANCE FROM IMPROPERLY MANAGED DOMESTIC WASTEWATER

Standard Operating Procedure:
Determining a Public Health Hazard or Nuisance
From Improperly Managed Domestic Wastewater

Kansas Administrative Regulation 28-5-6 stipulates that all domestic wastewater shall be discharged to an approved sewage collection system or an approved lagoon, septic system, or alternative system. Domestic wastewater means all waterborne wastes produced at family dwellings in connection with ordinary living including kitchen, toilet, laundry, shower, and bath tub wastewater. County and city health officials or representatives of the Kansas Department of Health and Environment may be called upon to investigate complaints involving the discharge of sewage from onsite wastewater systems. During the investigation, county, city, or State officials must determine whether or not domestic wastewater is managed so that:

1) quality of surface and groundwater is protected for drinking water, recreation, aquatic life support, irrigation, and industrial uses;
2) a breeding place or habitat will not be created for insects, rodents, an other vectors that may later contact food, people, pets, or drinking water;
3) wastewater will not be exposed on the ground surface where it can be contacted by children and/or pets, creating a significant health hazard;
4) State and federal laws and local regulations governing water pollution or wastewater disposal will be met; and,
5) nuisance conditions or obnoxious odors and unsightliness will be avoided.

The following is a general standard operating procedure for determining a public health hazard or nuisance from improperly managed domestic wastewater.

Making Contact With The Property Owner

State or county staff may be called upon to investigate a complaint regarding an onsite wastewater system. Many times the person reporting the complaint will not leave their contact information; however, if possible, it is valuable for the investigator to speak directly with the person reporting the problem to get additional information regarding the location and type of problem being reported. Often the investigator has only been given the general location of the problem. In this case, the investigator should visit the county appraisers office to get the property owners contact information. The investigator may wish to drive by the location to see if any evidence of a problem can be seen from the road. The investigator should then contact the land owner by telephone or letter to arrange a date and time to do a site visit. If a potential emergency exists, most county codes contain a “right of entry” statement that allows an inspector to enter the property to investigate, without the property owner being present.

Conducting The Site Visit

During the site visit, it is important for the investigator to interview the landowner and obtain as much information regarding the onsite wastewater system as possible. This information may include: type of system; age of system; installation contractor name; system maintenance information (date of last pumping/inspection); name of system pumping company; number of persons in household; water usage habits; and drainage problems (both inside the house and in the yard). This information can help define if a problem exists and can expedite a solution to the problem.

After interviewing the property owner, the investigator should do a walkthrough of the property and household to look for evidence of onsite wastewater system failure or improper operation. The following is a list of things to look for during the walkthrough. If any of the following conditions are observed during the site visit, there may be a potential health hazard.

Straight pipe discharge into a ditch or stream is common in some rural communities in Kansas. Straight pipe discharge to the waters of the State is illegal. According to Kansas Administrative Regulation 28-5-6, all domestic wastes from sanitary fixtures located in any dwelling, shop, school, or other building used as a home or meeting place for humans shall be discharged into a public sewer system approved by the Kansas department of health and environment, or into a private sewer system approved by the Kansas department of health and environment or the appropriate local authority. Toilet paper in ditches outside homes and buildings can be a good indication that a straight pipe discharge is present nearby. This would also be an indication that wastewater has not gone through a septic tank.

System backup can occur when a system is blocked and wastewater from the household will not drain properly. Evidence of system backup may include staining around toilets and sinks and slow draining sinks, toilets or other plumbing.

System breakout is the discharge or ponding of septic system effluent on the ground surface above or near the absorption field. This effluent should have a noticeable odor and may have a grayish or blackish appearance. System breakout may indicate that the absorption field is blocked or not sized correctly to handle the household's wastewater treatment and disposal needs. Lush vegetation growing over the absorption field can sometimes be indicative of system breakout.

Mechanical damage to a system may occur for a variety of reasons. Steel tanks can corrode and develop leaks or collapse. Baffles inside septic tanks can corrode and break off, causing solids to enter and block the absorption field. Driving over the absorption field can cause damage to the piping and trenches. Tree root systems growing in the absorption field can also cause piping or trench to become clogged and ineffective.

Design flaws can also render an onsite waste water system ineffective. High groundwater levels or low lying areas above the absorption field may cause the system to fail. Locating the system too close to an existing stream, property line, or water well can increase the likely hood that a health hazard is present (consult local county sanitary codes for applicable separation distances). Also, the system may simply be undersized to handle the wastewater disposal needs of the household.

Lack of maintenance can cause a septic system to fail. On average, a septic tank should be pumped out and inspected every three to five years. Failure to pump out the system can cause solids to enter the absorption field and clog pipes and infiltration trenches. Lagoons must also be maintained. Sludge on the bottom of the lagoon should be pumped in order to preserve storage capacity. Property owners must also construct and maintain a fence to prevent access to any lagoon.

Lack of separation distance between onsite wastewater systems and adjacent water resources may cause a health hazard. Adequate separation distances must be maintained between the system and any nearby water resources including underlying groundwater aquifers or perched seasonal water table, lakes, streams, and wetlands. Specifications outlined in Kansas Department of Health and Environment Bulletin 4-2 address system location and separation distances. Separation distances specified in local county sanitary codes may be more restrictive than those outlined in bulletin 4-2.

Effluent Sampling

On occasion, field staff will collect a sample from surfacing domestic wastewater effluent to determine if a health hazard exists, or if there is a violation of water quality standards. All effluent samples will collected using the following protocol:

The following describes the proper procedures for the collection, preservation, and transportation of samples from failing onsite wasterwater systems or related discharges.

It is difficult to anticipate site conditions prior to inspecting an onsite wastewater system. An inspector should be prepared to collect samples to help determine if a public health hazard exists. Samples may be collected from effluent surfacing above a septic tank, absorption field. saturated soils above the absorption field, or from a straight pipe discharge into a ditch or stream.

EQUIPMENT;

General.

- Non- talc disposable Latex gloves
- Safety glasses
- Sample bottles (below)
- Small stainless steel bucket and funnel
- Small stainless steel trowel or shovel
- Cooler with ice

- Camera
- 'Alconox' or similar anti-bacterial solution for equipment decontamination
- De-ionized water for rinsing sampling equipment or hands
- Hand sanitizer solution
- Plastic tub and brush for washing sampling equipment
- Towel
- Rubber boots
- Sample information forms, including chain of custody, & labels
- An "orange" safety vest may be advisable if sampling near a busy roadway

For Nutrient Samples - (includes Ammonia, Kjeldahl Nitrogen, Total Phosphate)
180 ml. Square Nalgene translucent sample bottle

For Bacterial Samples - Fecal Coliform & Fecal Streptococcus Bacteria –
240 ml. Translucent Nalgene sample bottle

For Biochemical Oxygen Demand (BOD) – 1,000 ml. Cube container (plastic)

Samples of soils should be containerized in either clean plastic sealable baggies or in glass jars supplied by the laboratory.

Other tests not covered here are available for Dissolved Oxygen, Pesticides, Heavy Metals, etc. Collection methods will be similar but sample handling requirements may vary.

PROCEDURE;

General.

- Always protect your self from exposure to suspected raw sewage effluent. Wear latex gloves, safety glasses, (rubber boots if needed) when taking samples. Be careful not to splash or spill effluent onto clothing. Wash hands thoroughly with soap & water or antibacterial cleanser after grabbing and handling samples. Change and wash any contaminated clothing as soon as possible. Since ditches, lagoon banks, etc. can be slippery take care not to fall into the effluent !

- Handle sample bottles with care and not with bare hands to avoid contamination of the bottles or caps with your own skin bacteria.

- Use the stainless steel bucket (must be decontaminated) or a separate sterile sample bottle to dip into the effluent and carefully pour sample into second sterile sample bottle using the decontaminated funnel. Do not dip the sample bottle to be sent into the lab directly into the effluent.

- Take the sample(s) as close to the source of the effluent as possible, i.e., if a "straight pipe", at he end of the pipe if possible and flow is occurring, otherwise as close to the end of the pipe as possible. In some cases it may be advisable to avoid trespassing on private property even if the effluent source is located thereon and you may have to grab the sample from the nearest located public access or property.

- If possible you may want to interview the property owner or occupier to obtain as much information as possible regarding the onsite wastewater system as to its type, age, date last pumped, size of household, and other information that may help define if a problem exists and can expedite a solution to the problem.

- If sufficient effluent or water depth is not present, you may need to collect a saturated soil sample. Use the stainless trowel or shovel (decontaminated of course) to transfer the soil sample into a sealable plastic baggie or sterile sample jar.

- Take photographs of the location and the suspected source of the effluent. If possible take photos of the actual sample(s) being grabbed. A photo including an identifying feature of the particular location and showing the person or their hands actually dipping the sample could be important if the validity or location of the sampling were ever questioned. Label photos with location, ownership, and date information for reference.

- Required information on a sample submission "form" is;
  Date
  Time of Day
  Address or legal description of location
  Samplers last name and first initial
  Sample type or purpose – Nutrients, BOD, or Bacteria (FCB)

- **Equipment Decontamination**: All sampling equipment should be decontaminated prior to the start of sampling activities **and between** sampling sites. Decontamination activities should include washing equipment in an Alconox (or similar anti-bacterial) solution and rinsing thoroughly with de-ionized water

SAMPLE HANDLING;

- **Bacterial Sample**
  Fill 240 ml. Bottle to neck. Securely cap bottle. Preservation requirement is Cool, 4 degrees C, or 40 degrees F. Place in cooler with ice. Store in refrigerator or with ice. Transport on ice. **Holding time is only 48 hours**.
  Label or identify bottle

- **Nutrient Sample.**

Fill 180 ml. Bottle to neck. Cap bottle. Preservation requirement is Cool. 4 degrees C, or 40 degrees F. Place in cooler with ice. Store in refrigerator or with ice. Transport on ice. **Cool holding time up to 28 days** when acidified to pH<2 (1 ml. Of a 1:15 H2SO4 or 2 ml. Of 1:30 – sulfuric acid solution)
To acidify discard small amount of sample and add acid solution, securely cap bottle and shake for about 10 seconds to thoroughly mix sample and preservative. Label or identify bottle.
Remember to test for ammonia as it may show a nitrogen problem that the nitrate test alone might not identify

- **BOD Sample:**
  Fill 1,000 ml. cube container to neck. Cap the bottle. Preservation
  Requirement is Cool, 4 degrees C. or 40 degrees F. Place in cooler with ice. Store in refrigerator or on ice.
  Transport on ice. **Holding time – 48 hours**

Deliver or send samples to lab for processing. Be sure to have the lab sign and give a receipt with date and time for chain of custody purposes. This can be very important in a situation that may involve controversy.

Remember that you are handling potential disease causing pathogen laden material.

BE CAREFUL. Wash your hands, arms, face or other exposed skin thoroughly after sampling. Carefully **discard** any used latex gloves. **Change and wash** any clothing you may suspect has become contaminated as soon as possible. You may want to carry a disposable plastic bag to place rubber boots in after sampling to prevent contamination of your vehicle until you get a chance to clean off your boots (again soap & water !)

APPENDIX B

STANDARD OPERATING PROCEDURE NPS-002

STANDARD OPERATING PROCEDURES FOR CONDUCTING CWA SECTION 404 PERMIT FIELD INVESTIGATIONS

Conducting a 401 Water Quality Certification Field Investigation

A. Purpose: As stated in Section 2.2, the Watershed Management Section (WMS) is responsible for issuing CWA Section 401Water Quality Certifications for dredge, fill, levees, channel change and stream obstruction activities in the waters of the US (US Department of Army Corps of Engineers). The WMS is also authorized under K.A.R. 28-16-28f(c) to issue a similar certification. These certifications mandate water quality protection measures be implemented on-site to avoid water quality standard violations. At the discretion of the Water Quality Certification Coordinator (WQCC), WMS or district Watershed Field Coordinators (WFCs) may conduct field investigations of dredge, fill, levees, channel change and stream obstruction activities to determine compliance with CWA Section 401 Certification requirements.

B. Procedure:

a. The WQCC will determine at the time of issuance which sites will require inspection and when the inspection should occur. Inspections will occur under the following circumstances:

i. Has received an NPDES construction stormwater permit.

ii. Projects occurring near or in Outstanding National Resource Waters, Exceptional State Waters and Special Aquatic Life Use water as documented in the Kansas Surface Water Quality Standards [KAR 28-16-28b through KAR 28-16-28g] which includes the Kansas Surface Water Register.

iii. Near a public water supply intake.
iv. Origin of a complaint
v. Attempts to meet the permitting agency project manager schedule to initiate a team inspection.
vi. Deemed to be significant impact if water quality protection measures are not implemented.
vii. Type of activity has been identified in a WRAPS.

b. The WQCC will copy the 401 Certification to the field inspector for reference at the time of issuance. This will include the name and contact information for the site visit and the permitting agency project manger. The 401Certification will include the project period limitation and a description of water quality protection measures. The 401 Certification requires that the Permittee post the water quality certification and a Water Quality Protection Plan or similar document that includes site specific water quality protection measures to be implemented, locations, etc.
c. During the field investigation, KDHE staff will ask to see the Water Quality Protection Plan and verify if appropriate water quality protection measures have been implemented.digital photos should be taken of all water quality protection measures and other locations of concern.
d. KDHE staff conducting the investigation must document the investigation and report their findings to the WQCC. Other KDHE Bureaus or Sections may need to be copied with the report, depending on the regulatory status of the site.

APPENDIX C

STANDARD OPERATING PROCEDURE NPS-003

SAMPLE COLLECTION, PRESERVATION AND HANDLING

APPENDIX C

TABLE OF CONTENTS

I. SAMPLING AND ANALYSIS

A. Purpose: The basis for any water quality monitoring program rests upon information obtained by sampling. Decisions based on incorrect data may be made if sampling is performed in a careless or thoughtless manner. Obtaining good results depends on the following factors: 1. Ensuring that samples are truly representative, 2. Using proper sampling techniques, and 3. Protecting and preserving the samples until they are analyzed.

The greatest errors are usually caused by improper sampling or preservation. Surface water samples collected by the WMS may be grab samples or composite samples. Grab samples are collected at fixed intervals and usually include both baseflow and runoff event samples. Composite samples are collected exclusively from stormwater runoff events.

B. Types of Samples

Following are procedures for collecting the four basic types of water samples gathered by the WMS.

1. Grab Samples

Grab samples are collected and analyzed in accordance with KDHE Bureau of Environmental Field Services SOP No. SCMP-001.

2. Groundwater Samples

Groundwater samples are collected and analyzed in accordance with KDHE Bureau of Environmental Field Services SOP No. GQMP-005.

3. Stormwater Runoff Event Samples

a. Stormwater runoff events are collected using automatic sampling units located in the field. Refer to Section 3.1.1 of this document for site selection criteria. Once an acceptable site has been located, follow the installation procedures listed in Chapters 2 and 3 of the Isco 3710 Portable Sampler Manual to install the sampler at the site.

b. Stormwater runoff event samples are typically collected over a period of several hours to create a composite sample. The following table is an example of how the sampling unit should be programmed for sample collection:

TIME	SAMPLE VOL (ml)
0600	400
0615	400
0630	400
0645	400
0700	400
0715	400
0730	400
0745	400
0800	400
0815	400
0830	400
0845	400
0900	400
0930	400
1000	400
1030	400
1100	400
1130	400
1200	400
1230	400
1300	400
1350	400
1400	400
1450	400
1500	400
1550	400
1600	400
1650	400
1700	400
1750	400
1800	400
	12,400 ml

c. Once a sufficient number of runoff samples have been collected by the automatic sampling unit, follow the guidelines listed below to transfer the sample from the unit to the sample bottles.

1. Remove the cover of the sampling unit, and remove the composite jar from the sampler. Fill the dissolved oxygen bottle first. Carefully pour the water from the jar into the glass dissolved oxygen bottle so that water flows into the bottle smoothly and without aeration. When full,

the bottle should be held at a slight angle to the vertical and the tapered stopper inserted firmly. If done correctly, no air bubble will be trapped inside the bottle.

1 ml of MnSO4 is added, (Reagent #1), then 1 ml alkaline iodide-azide solution (Reagent #2). The stopper is replaced as before and the bottle mixed by inverting the bottle a few times. Then the floc produced in the sample is allowed to settle. When a clear supernatant is formed above the settled floc, 1 ml conc. H2SO4 is added, (Reagent #3), the stopper is replaced and the sample inverted a few times to mix. The sample, at that point, is fixed and can be titrated at a later time. The sample should be stored in a cool place if possible and out of direct sunlight.

A 1 liter polyethylene collapsible sample container (cubitainer) should be used for BOD, TSS, and inorganics. The sample for nutrients (NH4+, NO3-, PO4) and heavy metals shall be collected in specially prepared 250 ml. plastic containers obtained from the KDHE laboratory. These containers have preservatives (strong acids) and should be handled carefully to avoid injury to person and property. These containers should not be immersed in the sample bucket in order to avoid loss of the preservatives.

Samples that will be analyzed for ELISA pesticide analyses should be poured into the small glass vial(s) provided by the KDHE laboratory. Be sure the inside of the bottle lid has a teflon liner. Samples that will be analyzed for all pesticides should be poured into the one gallon glass container provided by the KDHE laboratory. Samples for VOC analysis should be poured into the VOC container provided by the KDHE laboratory. The container should be placed on a flat surface and the sample poured gently into it.

The VOC sample container should be overfilled so that the water surface tension causes the water to "heap up" atop the container. The plastic septum should be placed atop the container, shiny side down, displacing the excess water and allowing no air bubbles into the container. The black plastic ring is then screwed on firmly. The container should be inverted and tapped with a fingernail to make sure there are no air bubbles. If air bubbles are discovered, re-collect the sample.

BOD, pesticide and VOC samples should be placed on ice for transfer to the laboratory. The inorganic samples do not need to be iced but for convenience may be iced with the rest of the samples.

Samples for bacteriological analysis should be collected in the 250 ml. plastic bottle provided by the KDHE laboratory or other certified laboratory. The samples should be immediately iced for transport to the laboratory.

2. Sample collection tubing should be checked after each use to prevent solids or debris from entering the sample container(s). Nitrifying bacteria can coat the tubing walls causing unexpectedly high BOD results. New tubing should be installed and the old tubing should be discarded if the old tubing is deemed to have too much debris in it.

3. Field sample submission forms must be filled out at the site where samples are collected. Data should include the name of the sample collector, legal description of the sampling site, site I.D. number, the type of media sampled, date and time, and program code. Check marks should be made in the appropriate boxes under the Organic Chemistry Laboratory analyses and the Biochemical Analyses. Cubitainers and ELISA pesticide bottles should be marked with indelible ink to indicate the site number, date and time, and sample collector. The remaining bottles should already be numbered by the laboratory, and these numbers should be written in beside the box of the desired analysis. Any anomalies noted during collection, transport or storage of the samples should be indicated in "Sample Comments" section of the Sample Submission form.

4. Rock Plant Filter Strip Samples

a. Each sampling port should be bailed 3 times before collecting the sample. The bailer should then be used to pour the water sample into the lab-supplied bottles. Normally, effluent samples from rock plant filter strips are analyzed for the following parameters: Fecal coliform/fecal streptococci bacteria, BOD, TSS, Total N, Total P, conductivity, pH, and temperature. On-site analysis of conductivity, pH, and temperature should be analyzed in accordance with KDHE Bureau of Water SOP No. WPCP-002. The remaining parameters should be collected, preserved (if necessary), stored, and transported in accordance with KDHE Bureau of Environmental Field Services SOP No. GQMP-005.

b. Impermeable rubber or latex gloves should be worn by the sample collector at all times during the sample collection and preservation process due to the possible presence of pathogens within the wastewater. All samples are to be collected directly from the standpipe port. Fill the sample bottles without touching the containers to the sample valve or other objects. Do not allow foreign matter to enter the sample containers. Take care not to contaminate the

sample bottles or lids. If this does occur, start over with a fresh container. All aspects of sample collection, preservation, and storage shall be in accordance with the Bureau of Environmental Field Services SOP No. GQMP-005. The exact location of each standpoint sampled by the collector shall correspond with its location on the design map of the treatment system which depicts the precise location of each port, and its assigned number.

Samples to be transported to an offsite laboratory shall be preserved and iced as per 40 CFR Part 136.3, Table II. Custody may be retained by the sample collector and transferred to the laboratory, transferred to a transporter, or the sample may be mailed directly to the laboratory, provided holding times will not be exceeded. Ultimately, the sample chain of custody will be transferred to the laboratory in accordance with the laboratory QA/QC protocols.

c. Sample Submission forms should be filled out in accordance with instructions listed above in the Stormwater Runoff section.

APPENDIX D

STANDARD OPERATING PROCEDURE NPS-004

MANAGEMENT AND REPORTING OF DATA

I. DATA CUSTODY

The purpose of this standard operating procedure (SOP) is to establish uniform policies and procedures for maintaining an accurate written record of a sample from the time it is collected through its introduction into water quality summaries or other related reports to insure that a sample has not been tampered with or altered throughout the process.

A. The sample by definition is in custody if:

1. It is in actual physical possession of the sample collector.

2. It is in view of the sample collector after being in the collector's physical possession

3. It is locked up after being in the sample collector's physical possession.

4. It is placed in a designated secure area.

B. FIELD PROCEDURES

1. Chain -of- Custody procedures will be followed for all tests deemed to be of importance for compliance with statutes and regulations and for those which could become evidence in litigation. Samples for plant process control, field screening analyses, or other samples collected for a technical or information purposes will not need to follow chain of custody procedures. In general, those samples submitted to the KDHE laboratory will be subject to chain of custody procedures.

2. In order to insure adequate control and documentation of collected samples, the number of personnel handling the samples should be minimized.

3. A unique number shall be assigned to each sample for identification purposes. If a sample consists of several bottles for analysis of different parameters from the same sample, the same sample number is used for each portion of the original sample.

4. If the samples are to be shipped to other laboratories for analysis, a sample label is attached to each sample container at the time of collection.

5. Record all field measurements and other pertinent data on the field sheet.

6. Custody of the sample is initiated at the time of sample collection by insuring that the sample is in the sample collector's physical possession or view at all times, or is stored in a locked place where there could be no reasonable possibility of tampering. The sample collector is responsible for the collected samples until they are received by the laboratory or have been

appropriately shipped to the lab. The chain of custody record is initiated at the time of sample collection and a copy accompanies the samples. The chain of custody record is at the bottom of the KDHE laboratory sheet.

Signatures and dates on the sample custody sheet shall be signed in indelible ink. The sample collector shall make sure the name, date, time, exact location, sample identifiers and parameters for analysis are listed before signing off. The person assuming custody shall sign and date the custody section of the sheet in the sample collector's presence. An exception is samples delivered after hours-these must be placed in the designated sample storage area of the KDHE laboratory by the individual having custody.

II. DATA MANAGEMENT

Data received from the laboratory shall be forwarded to the Quality Assurance Officer or Chief of the WMS, Bureau of Water, or a designated project manager. The data will be examined and any unusually high values or values considered to be unreasonable will be noted and brought to the attention of the laboratory and the appropriate project manager. High values for a given contaminant or parameter may indicate a real problem, but occasionally occur as a result of a decimal error, a missed dilution at a permittee laboratory, sample collection at the wrong location or other error. Such errors should be corroborated and noted and initialed on the data reporting sheet prior to passing the information along or filing.
Significant figures must be checked to ascertain that no unusual degree of accuracy is implied by the result. For instance, BOD values expressed to thousandth of a milligram per liter.

The copy distribution list shall be reviewed to make sure the information is distributed to all who need it. A copy is routed to the appropriate file and/or electronic data base.

APPENDIX E

STANDARD OPERATING PROCEDURE NPS-005

EVALUATION OF DATA QUALITY

QUALITY CONTROL AND STATISTICAL EVALUATION OF DATA

Accuracy is a measure of how closely the analytical result or the average of a set of analytical tests approaches the true value of a parameter. Two types of error affect accuracy: systematic error and random error. An example of systematic error would be inaccuracy in a piece of laboratory equipment, for example a laboratory balance that consistently under-weighs. Random error is error from a variety of sources which cannot be totally controlled. Errors in the use of pipettes, graduated cylinders, or other laboratory equipment are examples. Random error is controlled by averaging a series of replicate analyses of a sample.

Precision measures how closely a series of replicate measurements approaches the average. It is a measure of how well results can be reproduced. A laboratory may have a high degree of precision on a given test but be inaccurate. It is necessary to control both precision and accuracy to achieve a consistency of data quality.

A number of methods are available for evaluating both accuracy and precision. However these measures do not account for errors in sampling and handling that occur prior to laboratory analysis.

A. Commercial Laboratories

Private, commercial laboratories providing water or effluent quality data to the WMS shall be certified by the Kansas Department of Health and Environment and shall follow the Laboratory Certification Section guidelines for data evaluation and quality.

B. Contract laboratories analyzing samples for WMS projects must conform to the following general guidelines for data quality and evaluation:

1. At least 10% of a given number of samples should be for quality control purposes. At least one blank, one spike sample and one set of duplicates shall be analyzed with each sample set.

2. For accuracy determinations spiked samples shall be used. The use of spikes is preferable to the use of analysis of known standards as the spikes more nearly approach the true range of values encountered in analyzing the samples. The procedure involves the addition of a known quantity of standard to a known volume of unknown sample. Replicate analyses of both the known and the unknown sample are run and the results are compared to generate a percent recovery . Ideally , the result should be 100% but results between 90%
and 110% are acceptable. The procedure for calculating percent recovery is as follows:

a. Determine the unknown sample concentration by averaging the results of replicate

analyses.

b. Calculate the theoretical concentration of the spiked sample using this formula:
Theoretical Conc. =

c. Determine the spiked sample concentration by averaging the results of the duplicate analyses.

d. Divide the spiked sample concentration by the theoretical concentration. Multiply the result by 100. The result is the percent recovery.

3. For measurement of precision it is necessary to measure a series of replicate samples. The degree of precision required shall be determined at the outset of the project and incorporated onto the project QA/QC Plan. The determination of precision shall be through the use of average deviation, variance and standard deviation.

C. Stream Sampling

The SOP No. SCMP-001 developed by the Bureau of Environmental Field Services (BEFS) for determination of data quality in stream sampling is adopted by reference.

APPENDIX F

BIBLIOGRAPHY

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